CLEAR WOOD PRICE PREMIUMS & STAND VALUE GAIN FROM PRUNING

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CLEAR WOOD PRICE PREMIUMS & STAND VALUE GAIN FROM PRUNING

Introduction

Dimensional lumber from British Columbia that is "clear" of knots and defects has always commanded premium prices on world markets. Figure 1, page 3, shows a price premium ranging from two to five times for clear over not-clear two-inch dimensional lumber over the 20-year period, 1981 – 2000.

Most of British Columbia's clear wood has historically come from naturally-pruned coastal old growth forests. However, with continued harvesting this old-growth resource is diminishing. Clear wood products have correspondingly decreased in their percentage of total annual harvest, from 19% in 1984 to less than 9% in 2000. For the purposes of this report, *clear wood* in a standing tree or log is defined as wood that is capable of producing dimensional lumber of at least 2-inch thickness that is completely clear of knots and defects. Thus, a section of a tree must have approximately 3 inches of radial, branch-free growth in order to contain any clear wood (approx. 15 cm on a diameter basis). Under this definition, an unpruned coastal Douglas-fir tree will produce virtually no clear wood until at least 100 years of age due to very slow natural pruning (Kachine, 1940)[1]. The only way to produce significant future volumes of clear wood in a shorter period of time is by manually pruning young stands. In British Columbia, pruning is typically done in two stages, or *lifts*, to a total lift height of 5.5 to 6 metres.

Pruning is a very costly silvicultural treatment, (1991-1998 provincial average roughly $1000/ha per lift). Financial analyses have demonstrated that pruning must be carried out on appropriate stands within a very narrow window of opportunity in order maximize return on investment[2].

For planning and budgeting purposes, there is a need to estimate the stand value gain (SVG) that can be anticipated as a result of pruning treatments. To this end, this paper:

- develops value multipliers (VM's) for clear over not-clear lumber using twenty years of historical lumber pricing information supplied by Madison's Canadian Lumber.

[1] Kachine, T. 1940. Natural pruning in second-growth Douglas-fir. USDA For. Serv. Res. Note PNW-31. Pac. NW For. and Range Exp. Sta., Portland, OR

[2] The Forest Practices Code *Pruning Guidebook* (1995) effectively defines this pruning investment window through its recommended crop tree heights and diameters at which stands should be pruned. Also, Mitchell, K.J. 1995. Simulate the treatment before pruning the stand. In Forest pruning and wood quality of western North American conifers. *Edited by* Donald P. Hanley, Chadwick D. Oliver, Douglas A. Maguire, David G. Briggs, and Roger D. Fight. College of Forest Resources, U of W, Institute of Forest Resources Contribution No. 77, Seattle, WA.pp. 281-290.

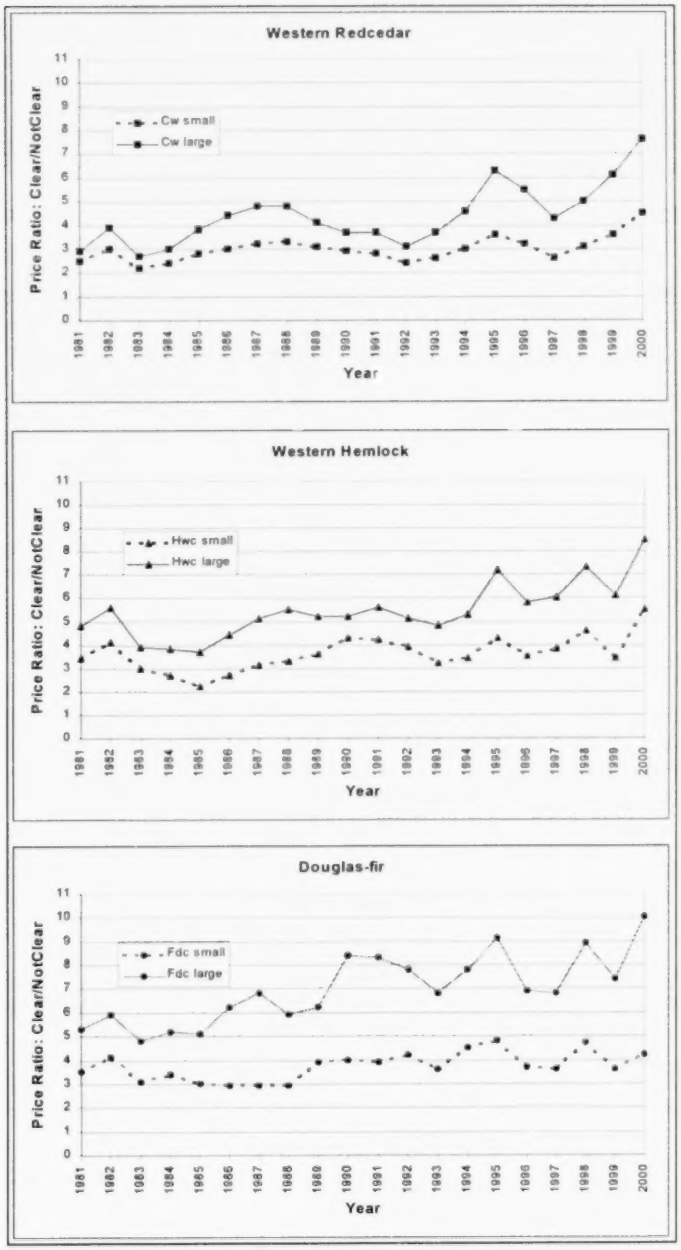
- contains historical chip price information, together with twenty year average prices by species;
- presents estimates of relative proportions of clear lumber in stands, developed using the Ministry of Forests' Tree and Stand Simulator (TASS) growth model and SYLVER modelling system;
- using the lumber and wood chip price and volume data, derives estimates of overall stand value gains (SVG's) resulting from pruning; and
- demonstrates how SVG's may be used in forest management unit planning and budgeting processes.[3]

This information is presented for four British Columbia tree species, coastal Douglas-fir (Fdc), coastal western hemlock (Hwc), western redcedar (Cw) and interior lodgepole pine (Pl).

- *Stand value gain* should not to be confused with *net present value*, which is determined through financial analysis. The term *value gain* as used in this paper is synonymous with *revenue gain*. The purpose of this paper is not to demonstrate financial analysis methodologies but to present a methodology and data that can subsequently be used in other planning, analysis, and budgeting processes.

[3] The term *forest management unit* refers to the 34 tree farm licenses (TFL's) and 37 timber supply areas (TSA's) in BC.

Figure 1. Annual Price premiums for Clear Over Not-clear Lumber, 1981 - 2000



(See Appendix C for data.) The 'small' ratio compares the price of 2X4 and 2X6 inch clear lumber to not-clear lumber of the same sizes. Because there were no price data for large not-clear lumber, the 'large' ratio compares the price of large clear material (2½X6, 3X6, and 4X6) to the price of small not-clear lumber (2X4 and 2X6). The ratios may not be as high for large clear relative to large not-clear lumber prices. The 'large' ratios shown would be appropriate in an analysis comparing growing an unpruned stand on a shorter rotation (producing small not-clear material) vs a pruned stand on a longer rotation (producing large clear material).

Will Price Premiums for Clear Lumber Continue?

Will the price premiums for clear lumber continue into the future? Some would argue, yes, particularly in view of increasing scarcity. Indeed, Figure 1 shows a slight rising trend in price premiums over the past 20 years.

Others would argue, no, the price differential may not continue, believing buyers may not be willing to pay the same price for more coarse-grained second growth Douglas-fir as they have for finer-grained old-growth. There are two counter-arguments to this, however.

First, while no doubt commercial buyers such as manufacturers of windows and doors do differentiate the qualities and grades of clear lumber, this differentiation does not appear to have occurred at the retail level. For example, all retail building supply stores in the Victoria area do not differentiate between grain characteristics or between old-growth or second growth in their clear lumber sales. In fact, selling lumber of any grade made from old growth forests has become socially unacceptable to many retail buyers. In this environment many retailers would not want to label their products as such.

Second, Canadian lumber grading rules do not differentiate clear lumber on the basis of first or second-growth origin, only on growth rate evaluated as the number of annual growth rings per inch.[4] The standards for medium grain (4-5 rings/inch) and fine grain (6-30 rings/inch) are not excessively high hurdles for pruned second-growth trees on most BC growing sites, particularly at later tree ages. Lastly, not all old-growth has better wood quality. For example, extremely fine-grained old-growth Douglas-fir has weaker strength properties and lower visual appeal, as evidenced by the 30 ring/inch grade maximum for fine grain.

Other reasons for a negative price premium outlook include the threat of substitute products and the possibility of large-scale pruning programs elsewhere flooding future markets with clear material.

This paper does not attempt to divine the future, especially one 40 to 80 years away, and assumes the status quo price premiums for clear lumber will prevail.

Historical Lumber Prices and Clear Wood Value Multipliers

The term *value multiplier*, or VM, is used to express the relative price of clear lumber over not-clear lumber. The purpose of the value multiplier is to smooth out year to year or larger cyclical fluctuations in price and to present a simple expression of the relative value of clear lumber over not-clear lumber.

Madison's Canadian Lumber Reporter data for the last 20 years (1981-2000) for clear and not-clear dimensional lumber were used to estimate value multipliers.

[4] See *Standard Grading Rules for Canadian Lumber*, National Lumber Grades Authority, February, 2000, for more information on lumber grades.

Madison's not-clear lumber price data were based on 2x4 and 2x6 inch, green, random-length lumber graded standard and better (Std&Btr) and surfaced 4-sides (S4S). Clear lumber price data were based on eight feet & longer lumber graded as clears, #2/15%#3. Clear lumber prices are presented in two size groupings – small (2x4 and 2x6), and; large, (2½X6, 3X6 and 4X6). Price data were available for Douglas-fir, western hemlock and western redcedar and are included in Appendix C.[5]

As an example, the value multiplier for coastal Douglas-fir based on average prices over the past twenty years (Appendix C) is calculated as:

$$VM = \frac{\text{Price \$/Mfbm (clear two-inch lumber)}}{\text{Price \$/Mfbm (not-clear, two-inch lumber)}} = \frac{\$1409/Mfbm}{\$365/Mfbm} = \underline{3.9}$$

Where: $1,409 and $365 are the 20-year means for 2X4 and 2X6 clear and not-clear lumber respectively, in Canadian dollars.

Table 1 shows the resultant value multipliers by species and size grouping. The average VM across all species for two-inch dimensional lumber[6] (VM_{small}) is estimated to be 3.5. This means that clear lumber has historically commanded at least three and one-half times the price of not-clear lumber of this size class.

Table 1. 20-Year Average Prices and Value Multipliers for Small and Large Clear Lumber

Species	20-Year Avg Lumber Price (Can$/Mfbm)			VM_{small}	VM_{large}[7]
	Not-clear 2x4, 2x6	**Clear** 2x4, 2x6	**Clear** (2½x6 to 4x6)	2x4, 2x6	(2½x6 to 4x6)
Fdc	365	1,409	2,627	3.9	7.2
Hwc	363	1,322	2005	3.6	5.5
Cw	518	1,571	2372	3.0	4.6
Average	415	1,434	2335	3.5	5.6
Pl[8]	415	1,434	2335	3.5	5.6

Based on 20-year average prices (in year 2000 dollars) from 1981 to 2000 (Appendix C). Mfbm – Thousand feet, board measure.

[5] Madison's data are based on clear dimensional lumber primarily manufactured from old growth timber. The implications of applying this data to clear lumber from future second-growth stands are addressed in the preceding section.
[6] Two-inch thick lumber (e.g., 2X4, 2X6, etc), either clear or not-clear, is referred to in this report as "two-inch dimensional lumber."
[7] See note below Figure 1, page 3.
[8] Madison's data are based on clear dimensional lumber primarily manufactured from old growth timber. The implications of applying this data to clear lumber from future second-growth stands are addressed in the preceding section.
[8] Two-inch thick lumber (e.g., 2X4, 2X6, etc), either clear or not-clear, is referred to in this report as "two-inch dimensional lumber."
[8] There were no clear lumber values available for lodgepole pine. The average VM was therefore assigned to Pl. (The prices for both clear and not-clear spruce-pine-fir (SPF) 2x4 and 2x6 dimensional material were very similar to Hw (Hem/Bal R/L, Green, Std & Btr, S4S – 2x4 and 2x6).)

Larger clear material (2½x6, 3x6, 4x6, 5x6, and wider) have historically commanded significantly higher price premiums over not-clear two-inch dimension lumber, as the last column of Table 1 shows. Figure 1, page 3, shows larger Douglas-fir clear dimensional material can command VM's upwards of 10 over small not-clear material.

There are no data for price premiums on one-inch clear boards (e.g., 1 x 4, 1 x 6, etc.) but the price would likely be equal to or higher than two-inch clear dimensional lumber due to more costly processing.[9] Similarly, prices for clear veneer are likely higher than for two-inch clear dimensional lumber on a per cubic metre basis. As there were neither price nor yield data for clear veneer, VM's could not be determined on the basis of this product.

Wood Chip Prices

Throughout the 1980's and early 1990's average BC wood chip prices tended to be in the neighbourhood of $100 per bone dry unit (BDU) or about $35/m^3. However, after a price spike in early 1996 the prices fell substantially in the late 1990's to about $ 60-70 per BDU and have remained at this lower level ever since.

In addition to the above overall price trends, there have also been significant historical differences in coastal versus interior chip prices. These are taken into account in this paper by applying coastal chip prices to coastal Douglas-fir and coastal western hemlock and interior prices to lodgepole pine. Western red cedar chip prices are viewed as inferior for making wood pulp and have historically been priced distinctly below all other species. Consequently cedar chips must also be separately priced. For this report the value of cedar chips was set at $15/BDU or roughly $5/m^3. This value was taken from the TIPSY Help screen in TIPSY 3.0b.

Table 2 below presents average wood chip prices by species. Appendix D contains annual price data, adjusted to year 2000 dollars.

Table 2. Wood Chip Prices

Species	20 yr avg price/BDU	20 yr avg price/m3	Source
Fdc, Hwc	$93	$33	Coastal BC avg prices
Pl	$82	$29	Interior BC
Cw	$15	$5	Cw (coastal)

[9] Processing is more costly when sawing targets generating one-inch boards, as opposed to a one-inch board resulting from optimum lumber recovery.

Estimating the Proportion of Clear Wood in a Stand

The Ministry of Forests' SYLVER decision support systems was used to simulate the amount of clear wood in pruned coastal Douglas-fir (Fdc), coastal western hemlock (Hwc), western redcedar (Cw), and lodgepole pine (Pl) stands. Sylver evaluates the effect of **S**ilviculture on **Y**ield, **L**umber **V**alue and **E**conomic **R**eturn. Trees are grown in SYLVER by the Tree and Stand Simulator (TASS), an individual-tree, distance dependent (i.e., spatially explicit) stand growth model (Mitchell, 1975).[10] SYLVER[11] also contains bucking, sawing and grading routines (Mitchell et al. 1989[11]).

Modelling was based on a single typical silvicultural regime in British Columbia for each of the four species (Table 3, below). Regimes more appropriate to a particular management unit's silviculture practices can be run in TASS/SYLVER as necessary.[12]

Table 3. Silviculture Regimes Used in TASS/SYLVER Modelling

Species	Site Index Range (2 m increments)	Initial Spacing (sph)	Post Spacing Density (sph)	1st 3m Prune Tot Ht/age (m/yrs)	2nd 3m Prune Tot Ht/age (m/yrs)	Utilization level (cm)
Fdc	26 - 38	4444	600	6/12	10/14	17.5
Hw	26 - 36	8000	800	6/16	10/20	17.5
Cwr	26 - 36	8000	800	6/17	10/21	17.5
Pl	18 - 28	10000	900	6/14	10/20	12.5

Operational Adjustment (OAF) factors were set at 1.0 (i.e., OAF 1 & 2 = 1.0).

SYLVER output tables in Appendix A show the volume of wood chips, clear lumber and not-clear lumber production in 10-year increments from 40 to 120 years of age for the 4 species. Lumber volumes were calculated within SYLVER by converting dimensional products (in board feet) simulated in the model into equivalent cubic meters per hectare.

[10] TASS output is used in developing the yield tables used in another Ministry of Forests product, TIPSY. The help information in TIPSY indicates "...TIPSY was calibrated to conform to a database in excess of 10 000 permanent sample plots. The number of plots varies greatly by species, treatment, and site index." TIPSY help indicates reliability of yield projections on good growing sites is estimated as good for Fdc, Hwc and Pl species. Cw reliability on good sites is rated poor. Reliability is based on the number of plots by species, experience, and basic knowledge of tree growth and stand development. Reliability also varies by treatment, stand age and other factors.

[11] Mitchell, Kenneth J., Kellogg, Robert M., and Polsson, Kenneth R. 1989. Silvicultural treatments and end-product value. In Second growth Douglas-fir: Its management and conversion for value. A report of the Douglas-fir Task Force. *Edited by* Robert M. Kellogg. Forintek Canada Corp. Spec. Publ. No. SP-32, Vancouver, B.C. p. 130-167

[12] Contact Mario diLucca or Ken Polsson, Ministry of Forests, Research Branch, Victoria.

Estimating the Stand Value Gain from Pruning

The stand value gain (SVG) from pruning is a simple means for expressing the value of a pruned stand relative to an unpruned stand. By using 20 year average prices, the SVG smoothes out the effects of year to year and cyclical price fluctuations.

The SVG is calculated as the value of the pruned stand divided by the value of the unpruned stand as per the following formula.

$$\frac{(\text{Mfbm Clear X \$/Mfbm Clear}) + (\text{Mfbm Not-Clear X \$/Mfbm Not-Clear}) + (\text{BDU's Chips X \$/BDU Chips})}{(\text{Mfbm Not Clear X \$/Mfbm Not-Clear}) + (\text{BDU's Chips X \$/BDU Chips})}$$

$/Mfbm values are the 20 year average prices for clear lumber and not-clear lumber given in Table 1, page 5 and for wood chips in Table 2, page 6.

Although prices for wider not-clear lumber (e.g., 2X10, 2X12 lumber) have historically been higher than for 2X4 and 2X6 not-clear lumber, price data limitations necessitate the application of two-inch clear and not-clear dimensional lumber prices to all lumber. It is assumed that the same (if not greater) price differentials would occur in the larger widths.

Example 1: ACTUAL PRICES METHOD – Coastal Douglas-fir

This simple example only used the small clear value 2x4 and 2x6 dimensional material versus the not clear 2x4 and 2x6 dimensional material. The SVG can be calculated for a specific harvest age as demonstrated in Table 4 for coastal Douglas-fir and Table 5 for Interior Lodgepole Pine by extracting chip, not-clear and clear lumber volume per hectare For example, in Appendix A for coastal Douglas-fir harvested at age 80 years, the amount of chips, knotty and clear lumber is 290.90, 385.26 and 120.91 m^3/ha, respectively. . .

Conversion of bdu chip price to $/m3 price

20 year avg. chip price of $93 / BDU[13]
conversion factor of 2.82 m3/ BDU[14]
price/m3 = $93 per BDU / 2.82 BDU's per m3 = $33/m3

Conversion of not clear lumber price to $/m3 price

Lumber price of $365 / 1000 bd ft[15]
LRF of 300 bf/m3[16]
$/m3 = 0.3 X 365 = $110/m3

Conversion of clear lumber price to $/m3 price

Lumber price of $1409 / 1000 bd ft[17]
LRF of 300 bf/m3
$/m3 = 0.3 X 1409 = $423/m3

[13] Taken from Table 2 "Wood Chip Prices" - Coastal Douglas-fir whitewood chips 20 year average price
[14] Taken from TIPSY 3.0b Help Screen on conversion factor from $/BDU to $/$m^3$
[15] Taken from Table 1 20-Year Average Prices and Value Multipliers for Small and Large Clear Lumber
[16] It is assumed that 300 board feet of lumber can be extracted from each cubic metre of wood
[17] Taken from Table 1 20-Year Average Prices and Value Multipliers for Small and Large Clear Lumber

Table 4: Calculation of Stand Value Gain for Coastal Douglas-fir

Value of a Pruned Stand

	Volume (m3)	% All	%Lumber	Price ($/m3)	Value ($) All	Value ($) Lumber
Chips[18]	290.9	36.5%		33	9,600	
Not-clear lumber[19]	385.3	48.3%	76.1%	110	42,383	42,383
Clear lumber[20]	120.9	15.2%	23.9%	423	51,141	51,141
Total	797.1	100.0%	100.0%		103,124	93,524

Value of an Unpruned Stand

	Volume (m3)	%	Price ($/m3)	Value ($) All	Value ($) Lumber
Chips	290.9	36.5%	33	9,600	
Not-clear lumber	506.2	63.5%	110	55,682	55,682
Clear lumber	0	0.0%	423	0	0
Total	797.1	100.0%		65,282	55,682

Stand Value Gain

	ALL	LUMBER ONLY
Pruned Stand	103,124	93,524
Unpruned Stand	65,282	55,682
Difference	37,842	37,842

Percent increase:	58%	68%

[18] Appendix A: Coastal Douglas-fir Table - whitewood chip volume per hectare
[19] Appendix A: Coastal Douglas-fir Table – not clear lumber volume per hectare
[20] Appendix A: Coastal Douglas-fir Table – clear lumber volume per hectare

Example 2: ACTUAL PRICES METHOD – Interior Lodgepole Pine

This simple example only used the small clear value 2x4 and 2x6 dimensional material versus the not clear 2x4 and 2x6 dimensional material.

Conversion of bdu chip price to $/m3 price

20 year avg. chip price of $82 / BDU[21]
conversion factor of 2.82 m3/ BDU[22]
price/m3 = $82 per BDU / 2.82 BDU's per m3 = $29/m3

Conversion of not clear lumber price to $/m3 price

Lumber price of $415 / 1000 bd ft[23]
LRF of 300 bf/m3[24]
$/m3 = 0.3 X 415 = $124.5/m3

Conversion of clear lumber price to $/m3 price

Lumber price of $1434 / 1000 bd ft[25]
LRF of 300 bf/m3
$/m3 = 0.3 X 1434 = $430.2/m3

VM check 430.2/124.5 = 3.5 OK

[21] Taken from Table 2: "Wood Chip Prices" – Interior Lodgepole pine whitewood chips 20 year average price
[22] Taken from TIPSY 3.0b Help Screen on conversion factor from $/BDU to $/m^3
[23] Taken from Table 1: 20-Year Average Prices and Value Multipliers for Small and Large Clear Lumber
[24] It is assumed that 300 board feet of lumber can be extracted from each cubic metre of wood.
[25] Taken from Table 1: 20-Year Average Prices and Value Multipliers for Small and Large Clear Lumber

Table 5: Calculation of Stand Value Gain for Interior Lodgepole Pine

Value of a Pruned Stand

	Volume (m3)	% All	%Lumber	Price ($/m3)	Value ($) All	Value ($) Lumber
Chips[26]	135.14	53%		29	3,919	
Not-clear lumber[27]	84.75	33%	70.6%	125	10,594	10,594
Clear lumber[28]	35.22	14%	29.4%	430	15,145	15,145
Total	255.11	100.0%	100.0%		29,658	25,739

Value of an Unpruned Stand

	Volume (m3)	%	Price ($/m3)	Value ($) All	Value ($) Lumber
Chips	135.14	53%	29	3,919	
Not-clear lumber	119.97	47%	125	14,996	14,996
Clear lumber	0	0.0%	430	0	0
Total	255.11	100.0%		18,915	14,996

Stand Value Gain

	ALL	LUMBER ONLY
Pruned Stand	29,658	25,739
Unpruned Stand	18,915	14,996
Difference	10,743	10,743
Percent increase:	**57%**	**72%**

[26] Appendix A Interior Lodgepole Pine Table – whitewood chip volume per hectare
[27] Appendix A Interior Lodgepole Pine Table – not-clear lumber volume per hectare
[28] Appendix A Interior Lodgepole Pine Table – clear lumber volume per hectare

Using the SVG in Other Processes

The stand value gains produced in this paper are suited for use in the development of management unit silviculture strategies and silviculture budget allocation processes. The Ministry of Forests currently recognizes two methods of developing silviculture strategies for timber supply areas and tree farm licences.

Type I Silviculture Strategies

A Type I silviculture strategy is developed by means of a workshop and is based the best available information.

Where a pruning activity is proposed in a Type I strategy process, its potential outcome with respect to improved stand quality can be estimated by calculating the appropriate SVG factor for the desired harvest age of the pruned stand. Usually a single SVG that represents the typical target species, SI and expected harvest age will do for this exercise.

A simple method to estimate the percent of the total future harvest volume that will be in pruned logs is as follows. This method only works when a relatively constant annual level of pruning is planned into the foreseeable future.

Step 1: Assuming two-lift pruning is normal practice, divide the annual area to be pruned by 2. The result is the equivalent area that would be pruned with the full two lifts in any year.

Step 2: Divide the area calculated in Step 1 by the average area forecast to be harvested annually in the management unit at about the time the pruned stands will be harvested. This gives the proportion of future annual harvest area that will be in pruned stands.

Step 3: Multiply the proportion calculated in Step 2 by the proportion of stand volume that is in pruned logs selected from pruned stands. This will give you a rough estimate of clear wood volume harvested annually by species.

Type II Silviculture Strategy Analysis

A Type II silviculture strategy analysis is model-based, using computer models and best professional knowledge. The information presented in this paper could potentially be used in numerous ways with respect to assessing the value of pruning activities in Type II analysis, two of which follow.

One use would be to incorporate a matrix of SVG values (the SVG matrix would be developed based on species, site index and harvest age) into the model so as to plot the changes in stand value at the forest level over the planning horizon in every scenario. This would potentially provide insights as to the trade-offs between timber quantity and timber quality.

The information in this paper could provide the necessary SVGs that could be used in a full-scale financial analysis that includes data on treatment and manufacturing costs, lumber prices and clear lumber proportions by stand age and site index.

Application to Budget Allocation Process

At the time of this report, budget allocation processes were in a state of change. The provincial government has eliminated Forest Renewal BC and initiated a new Forest Investment Account (FIA) as the means for funding incremental silviculture activities (including pruning) on provincial forest land. It is not known whether the former system of budget development, the resource management plan (RMP) process, will be adapted to the new FIA.

Assuming that a process similar to the RMP will be required, individuals completing the RMP can calculate and use the appropriate SVG to indicate the outcome of any proposed pruning treatments in the RMP. This is done by converting the stand value gain into a percentage gain and then putting the proposed pruning treatment area under the appropriate "% change in stand value" column. The example below shows 100 ha in the >60% column. Pruning treatments will virtually always be noted in this and the 41-60 columns in view of their relatively high SVG's compared to other silvicultural treatments.[29]

Figure 2. RMP Worksheet Example, Timber Quality Outcome Section

Timber quality outcome (# ha, by % change in stand value)			
1-20%	21-40%	41-60%	>60%
			100

[29] Full instructions on how to complete the RMP allocation worksheet for a management unit are included in the *Regional RMP Allocation Workbook User's Guide*.

Acknowledgements

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APPENDIX A: TASS/SYLVER Output

1. **Coastal Douglas-fir**
2. **Coastal Western Hemlock**
3. **Coastal Western Redcedar**
4. **Interior Lodgepole Pine**

1. Coastal Douglas-fir

Age (yrs)	Top Height (m)	Chips (m^3/ha)	Lumber Volume (m^3/ha) by board dimensions (inches)						
			Grade	1x4	1X6	2X4	2X6	2X8	2X10	Total
40	26.16	95.71	Clear	2.40	0.83	8.28	5.69	4.78	8.70	30.69
			SS	0.00	0.00	3.94	1.25	3.10	8.39	16.68
			#1	0.00	0.00	8.97	5.01	2.68	5.12	21.77
			#2	0.00	0.00	8.33	4.84	2.89	3.77	19.83
			#3	0.00	0.00	3.06	1.98	1.02	2.38	8.45
			#4	0.00	0.00	1.85	1.15	0.65	1.68	5.34
45	29.00	123.24	Clear	2.76	0.65	10.66	4.68	3.61	20.65	43.01
			SS	0.00	0.00	2.72	1.55	2.67	15.76	22.70
			#1	0.00	0.00	9.73	6.33	5.54	10.27	31.87
			#2	0.00	0.00	9.01	6.57	4.58	11.12	31.28
			#3	0.00	0.00	3.35	1.74	1.91	5.23	12.23
			#4	0.00	0.00	1.93	1.53	1.17	2.67	7.31
50	31.57	149.31	Clear	2.84	1.34	11.20	4.59	3.70	33.01	56.68
			SS	0.00	0.00	2.18	1.59	2.93	18.18	24.88
			#1	0.00	0.00	10.91	9.11	5.56	19.26	44.83
			#2	0.00	0.00	11.14	8.03	5.91	19.37	44.45
			#3	0.00	0.00	3.49	2.94	2.36	8.46	17.25
			#4	0.00	0.00	2.32	1.90	1.50	5.88	11.60
55	33.90	175.21	Clear	2.28	1.10	15.27	4.40	3.24	43.28	69.57
			SS	0.00	0.00	2.22	1.83	1.93	24.08	30.07
			#1	0.00	0.00	12.07	10.74	7.62	26.43	56.87
			#2	0.00	0.00	12.13	9.72	6.28	29.74	57.87
			#3	0.00	0.00	4.03	3.09	2.06	12.74	21.92
			#4	0.00	0.00	2.66	2.23	1.35	8.28	14.52

Age (yrs)	Top Height (m)	Chips (m^3/ha)	Lumber Volume (m^3/ha) by board dimensions (inches)						
			Grade	1x4	1X6	2X4	2X6	2X8	2X10	Total
60	36.04	200.66	Clear	2.32	1.16	16.48	4.07	3.20	54.91	82.13
			SS	0.00	0.00	2.65	1.47	2.13	27.44	33.69
			#1	0.00	0.00	13.91	11.16	8.02	38.97	72.06
			#2	0.00	0.00	13.57	11.09	9.07	38.30	72.03
			#3	0.00	0.00	4.69	3.22	2.96	15.84	26.70
			#4	0.00	0.00	2.97	2.17	1.76	11.07	17.96
65	38.00	224.56	Clear	1.94	1.26	18.84	3.92	3.51	63.49	92.95
			SS	0.00	0.00	2.83	1.86	1.78	30.72	37.18
			#1	0.00	0.00	16.58	11.18	7.95	51.34	87.05
			#2	0.00	0.00	17.19	12.58	7.92	49.67	87.36
			#3	0.00	0.00	5.62	3.35	3.04	18.81	30.82
			#4	0.00	0.00	3.77	2.61	1.71	14.03	22.12
70	39.80	247.80	Clear	1.82	0.99	21.10	3.35	3.44	72.74	103.43
			SS	0.00	0.00	3.89	1.66	2.02	35.00	42.57
			#1	0.00	0.00	17.71	12.88	9.70	60.24	100.52
			#2	0.00	0.00	16.36	12.54	9.27	63.78	101.95
			#3	0.00	0.00	5.83	3.69	3.11	22.94	35.57
			#4	0.00	0.00	3.96	2.72	2.01	16.10	24.79
75	41.47	270.17	Clear	1.75	1.05	22.33	3.11	3.05	81.53	112.82
			SS	0.00	0.00	4.11	1.42	1.98	38.38	45.88
			#1	0.00	0.00	18.43	13.92	11.65	72.54	116.55
			#2	0.00	0.00	19.21	12.31	10.66	70.91	113.08
			#3	0.00	0.00	5.82	4.42	3.52	26.98	40.75
			#4	0.00	0.00	4.00	2.68	2.06	20.81	29.55
80	43.01	290.90	Clear	1.94	0.73	23.78	2.81	3.19	88.45	120.91
			SS	0.00	0.00	4.57	1.54	1.91	41.80	49.81
			#1	0.00	0.00	22.46	12.79	9.91	85.56	130.72
			#2	0.00	0.00	22.84	13.44	10.54	80.96	127.78
			#3	0.00	0.00	6.77	3.97	4.02	32.05	46.82
			#4	0.00	0.00	4.92	2.56	2.34	20.31	30.13
									Total Not-clear at age 80	385.26

Percentage solid clear wood per hectare at age 80

(Chips + clear + solid not clear) = (290.90 + 120.91 + 385.26) = 797.07 cu. m/ha

Percentage solid clear wood to total solid wood = (120.91/506.17) = 23.9%

Percentage total solid wood to total wood per hectare = (506.17/797.07) = 63.5%

Percentage clear wood to total wood per hectare = (.239 x .635) = 15%

2. Coastal Western Hemlock

Age (yrs)	Top Height (m)	Chips (m^3/ha)	Lumber Volume (m^3/ha) by board dimensions (inches)						
			Grade	1x4	1X6	2X4	2X6	2X8	2X10	Total
40	20.72	77.76	Clear	3.32	0.21	7.74	6.07	0.33	0.60	18.28
			#2	0.00	0.00	32.94	10.14	3.28	4.91	51.28
45	23.08	105.14	Clear	3.55	0.49	11.98	9.57	1.82	4.46	31.86
			#2	0.00	0.00	38.31	14.72	8.96	10.95	72.94
50	25.26	131.44	Clear	3.45	1.50	14.20	9.53	2.67	11.94	43.29
			#2	0.00	0.00	42.94	17.91	12.30	32.97	106.12
55	27.29	154.13	Clear	2.91	1.72	13.71	9.40	2.81	21.65	52.19
			#2	0.00	0.00	48.76	18.07	17.10	64.52	148.45
60	29.16	176.21	Clear	2.64	1.65	16.11	8.94	2.52	31.82	63.68
			#2	0.00	0.00	50.75	23.52	18.74	95.67	188.67
65	30.91	198.54	Clear	2.27	2.14	17.69	8.12	2.93	43.00	76.15
			#2	0.00	0.00	55.31	23.77	20.92	128.50	228.50
70	32.54	220.34	Clear	2.19	2.16	19.22	7.88	2.81	53.26	87.52
			#2	0.00	0.00	60.18	26.72	21.80	161.69	270.39
75	34.07	241.80	Clear	1.96	2.26	23.03	8.31	2.77	60.52	98.86
			#2	0.00	0.00	64.45	29.81	23.56	193.73	311.55
80	35.49	262.59	Clear	1.85	1.78	26.94	7.27	2.84	68.71	109.40
			#2	0.00	0.00	64.85	32.32	26.69	231.44	355.30

Percentage solid clear wood per hectare at age 80

(Chips + clear + solid not clear) = (262.59 + 109.40+ 355.30) = 727.27 cu. m/ha

Percentage solid clear wood to total solid wood = (109.40/464.7) = 23.5%

Percentage solid wood to total wood per hectare = (467.4/727.27) = 63.9%

Percentage solid clear wood to total wood per hectare = (.235 x .639) = 15%

3. Coastal Western Redcedar

Age (yrs)	Top Height (m)	Chips (m^3/ha)	Lumber Volume (m^3/ha) by board dimensions (inches)						
			Grade	1x4	1X6	2X4	2X6	2X8	2X10	Total
40	19.46	87.87	Clear	3.74	0.25	9.60	6.94	0.83	1.01	22.38
			#2	0.00	0.00	30.91	13.57	4.60	1.85	50.92
45	21.80	120.72	Clear	3.99	0.92	11.45	8.11	2.39	6.79	33.66
			#2	0.00	0.00	37.70	16.44	11.43	17.74	83.31
50	23.99	149.30	Clear	4.42	1.51	11.70	7.45	4.05	15.53	44.66
			#2	0.00	0.00	38.57	21.17	14.21	54.14	128.10
55	26.04	178.02	Clear	3.92	2.06	14.69	7.40	3.14	27.07	58.28
			#2	0.00	0.00	44.15	23.66	15.30	88.67	171.79
60	27.96	204.32	Clear	3.51	2.71	16.26	8.14	2.51	39.57	72.69
			#2	0.00	0.00	45.95	24.59	21.32	124.06	215.92
65	29.72	229.53	Clear	3.09	3.04	18.79	7.90	3.12	50.04	85.99
			#2	0.00	0.00	46.90	27.49	24.33	161.44	260.16
70	31.36	254.77	Clear	3.18	2.28	22.21	7.72	1.80	60.69	97.87
			#2	0.00	0.00	48.79	29.77	25.86	200.20	304.62
75	32.90	278.82	Clear	3.36	2.09	22.81	6.94	2.75	71.70	109.63
			#2	0.00	0.00	49.92	30.62	32.32	236.78	349.64
80	34.35	303.11	Clear	3.14	2.47	22.88	6.92	1.95	83.93	121.30
			#2	0.00	0.00	51.09	31.75	33.97	279.44	396.24

Percentage solid clear wood per hectare at age 80

(Chips + clear + solid not clear) = (303.11 + 121.3+ 396.24) = 820.65 cu. m/ha

Percentage solid clear wood to total solid wood = (121.3/517.54) = 23.4%

Percentage total solid wood to total wood per hectare = (517.54/820.65) = 63.1%

Percentage clear wood to total wood per hectare = (0.234 x 0.631) = 15%

4. Lodgepole Pine

Age (yrs)	Top Height (m)	Chips (m^3/ha)	Lumber Volume (m^3/ha) by board dimensions (inches)						
			Grade	1x4	1X6	2X4	2X6	2X8	2X10	Total
40	17.83	49.45	Clear	1.59	0.00	1.16	0.22	0.00	0.00	2.97
			#2	0.00	0.00	22.99	1.82	0.00	0.00	24.81
45	19.42	63.92	Clear	2.98	0.00	3.01	0.86	0.00	0.00	6.85
			#2	0.00	0.00	29.09	3.55	0.19	0.00	32.83
50	20.82	76.32	Clear	4.42	0.00	5.47	1.92	0.14	0.00	11.94
			#2	0.00	0.00	34.98	5.28	0.31	0.00	40.57
55	22.05	87.39	Clear	4.76	0.04	8.96	3.15	0.12	0.00	17.03
			#2	0.00	0.00	39.10	8.12	1.10	0.16	48.49
60	23.13	98.46	Clear	5.13	0.06	12.03	4.34	0.58	0.11	22.25
			#2	0.00	0.00	42.81	10.38	0.92	1.04	55.15
65	24.09	109.19	Clear	5.46	0.16	13.93	6.54	0.57	0.11	26.77
			#2	0.00	0.00	45.69	12.33	1.66	1.93	61.61
70	24.94	118.90	Clear	5.45	0.21	14.59	8.27	0.94	0.53	29.99
			#2	0.00	0.00	48.08	14.64	2.27	4.54	69.53
75	25.70	128.08	Clear	5.05	0.30	16.07	8.56	1.40	1.05	32.42
			#2	0.00	0.00	50.25	15.77	3.25	8.08	77.35
80	26.38	135.14	Clear	4.71	0.43	17.87	8.78	1.78	1.64	35.22
			#2	0.00	0.00	53.47	17.79	3.56	9.93	84.75

Percentage solid clear wood per hectare at age 80

(Chips + clear + solid not clear) = (135.14 + 35.22+ 84.75) = 255.11 cu. m/ha

Percentage solid clear wood to total solid wood = (35.22/119.97) = 29.4%

Percentage total solid clear wood to total wood per hectare = (119.97/255.11) = 47%

Percentage clear wood to total wood per hectare = (0..294 x 0.47) = 14%

APPENDIX B: 20 Year Value Multipliers

20 Year Average Value Multiplier (VM) for Clear Dimensional Material

The following table contains the 20 year average VM values for the four species for all dimensions (clear versus not clear). Tables can also be generated for the 5-15 year averages.

Not Clear Dimensional Material					Clear Dimensional Material						
					VM_{small}			VM_{large}			
Species	Dim.	2x4	2x6	Comb	2x4	2x6	Comb. 2x4-2x6	2 1/2x6	3x6	4x6	Comb
Cwr	2x4	1.0			3.04	3.6	3.3		5.03	5.02	5.03
	2x6		1.0		2.57	3.04	2.8		4.24	4.23	4.24
	Comb			1.0	2.81	3.32	3.1		4.64	4.62	4.63
Hw	2x4	1.0			3.6	3.7	3.7	5.5	5.6	5.6	5.6
	2x6		1.0		3.6	3.7	3.7	5.4	5.6	5.6	5.6
	Comb			1.0	3.6	3.7	3.7	5.5	5.6	5.6	5.6
Fdc	2x4	1.0			3.6	4.1	3.9	7.2	7.3	7.3	7.3
	2x6		1.0		3.6	4.0	3.8	7.1	7.1	7.2	7.1
	Comb			1.0	3.6	4.0	3.8	7.1	7.2	7.3	7.2
Pl*	2x4	1.0			3.4	3.8	3.6	6.4	6.0	6.0	6.1
	2x6		1.0		3.3	3.6	3.5	6.3	5.6	5.7	5.9
	Comb			1.0	3.3	4.0	3.7	6.3	5.8	5.9	6.0

*The VM numbers for Lodgepole Pine are based on the averages from the other 3 species, by clear dimensional material in Table 4.

APPENDIX C: Historical Lumber Price Tables

Data in the following tables is from custom reports prepared *by Madison's Canadian Lumber Reporter*.

Coastal Douglas-fir (available dim. lumber) Prices in year 2000 dollars

Madison's Canadian Lumber Reporter 20 year prices for clear/ not-clear dim. lumber

Year	Exch Rate	Not Clear dim. material ($/Mfbm)					Clear dim. Material ($/Mfbm)			Stand Value Multiplier			Clear dim. Material ($/Mfbm)				Stand Value Multiplier		
		US Dollars		Canadian Dollars															
		2x4	2x6	2x4	2x6	Comb.	2x4	2x6	Comb.	2x4	2x6	Comb.	21/2x6	3x6	4x6	Comb.	21/2x6	3x6	4x6
2000	1.444	314.8	335.0	454.5	483.8	469.1	1,938.0	2,034.0	1,986.0	4.3	4.2	4.2	3,839.6	4,623.0	4,672.5	4,378.4	8.2	9.9	10.0
1999	1.526	395.4	403.2	603.4	615.2	609.3	2161.6	2225	2193.3	3.6	3.6	3.6	4371.1	4429.6	4517.5	4439.4	7.2	7.3	7.4
1998	1.436	324.1	325	479.2	466.7	466.1	2176.6	2244.5	2210.6	4.7	4.8	4.7	4073.3	4037.5	4132.7	4081.1	8.7	8.7	8.9
1997	1.373	393.4	412.1	540.2	565.7	553	1911.5	2029.1	1970.3	3.5	3.6	3.6	3719.4	3741.1	3745.3	3735.3	6.7	6.8	6.8
1996	1.357	409.7	431	555.9	585	570.5	2052.6	2168.5	2110.6	3.7	3.7	3.7	4001.5	3964.1	3939.2	3968.2	7.0	6.9	6.9
1995	1.404	328.4	350.2	461	491.5	476.3	2246.1	2369.4	2307.8	4.9	4.8	4.8	4366.9	4306.2	4337.5	4336.8	9.2	9.0	9.1
1994	1.315	387.5	397.1	509.5	522.3	515.9	2117.5	2502.3	2309.9	4.2	4.8	4.5	3919.6	4008.6	4017.4	3981.9	7.6	7.8	7.8
1993	1.278	407.8	427.6	521.1	546.6	533.8	1666.8	2871.2	1934.1	3.2	4.0	3.6	3549.8	3588.6	3604.3	3580.9	6.6	6.7	6.8
1992	1.151	271.8	280.4	312.9	322.8	317.8	1164	1478.6	1321.3	3.7	4.6	4.2	2450.7	2456.8	2469.1	2458.9	7.7	7.7	7.8
1991	1.157	236.6	243.1	273.7	281.3	277.5	1031.1	1125.7	1078.4	3.8	4.0	3.9	2303.6	2293.2	2289.9	2295.5	8.3	8.3	8.3
1990	1.161	231.9	247.3	269.3	287.1	278.2	1068.3	1174.6	1121.5	4.0	4.1	4.0	2298.6	2293.2	2329.5	2308.9	8.3	8.3	8.4
1989	1.191	262.6	266.9	312.7	319.1	315.9	1139.5	1314.9	1227.2	3.6	4.1	3.9	1982.6	1933.6	1968	1961.4	6.3	6.1	6.2
1988	1.299	227	233.3	294.9	303.1	298.9	807.9	949.3	878.6	2.7	3.1	2.9	1777.1	1733.6	1772.9	1761.2	5.9	5.8	5.9
1987	1.379	203.5	198.5	280.5	273.7	277.1	738.8	851.5	795.1	2.6	3.1	2.9	1872.9	1853.3	1879	1868.4	6.8	6.7	6.8
1986	1.401	192.4	186.1	269.6	260.8	265.1	655.9	870.6	763.2	2.4	3.3	2.9	1670.9	1632.3	1650.7	1651.5	6.3	6.2	6.2
1985	1.323	185	172.5	244.6	228.2	2..6.4	669.7	762.2	715.9	2.7	3.3	3.0	1277.7	1165.5	1206.1	1216.4	5.4	4.9	5.1
1984	1.246	171.1	171.1	213.2	213.2	213.2	642.1	822.8	732.4	3.0	3.9	3.5	1147.8	1236.2	1105.9	1163.3	5.4	5.8	5.2
1983	1.23	201.1	183.2	247.5	225.2	236.3	641	793	717	2.6	3.5	3.1	1165.5	1135.2	1137.5	1146	4.9	4.8	4.8
1982	1.187	152.2	149.1	180.7	177.1	178.9	681.4	797.3	739.2	3.8	4.5	4.1	1105.2	1062.9	1063.6	1075.5	6.2	5.9	5.9
1981	1.195	176.2	174.3	210.7	208.3	209.5	703.7	756.9	730.3	3.3	3.6	3.5	1144.5	1104.7	1117.9	1122.3	5.5	5.3	5.3

Average $/Mfbm values for Coastal Douglas- fir for the last 5 – 20 years.

	Non-clear dimensional			Clear dimensional products						
	2x4	2x6	Comb.	2x4	2x6	Comb.	21/2x6	3x6	4x6	Comb.
last 5 years	527	543	534	2048	2140	2094	4001	4159	4201	4121
last 10 years	471	488	479	1847	2105	1976	3660	3745	3773	3736
last 15 years	409	422	415	1525	1747	1636	3080	3126	3155	3120
last 20 years	362	369	365	1311	1507	1409	2602	2630	2648	2627

Coastal Western Redcedar (available dim. lumber)

Madison's Canadian Lumber Reporter 20 year prices for clear/ not-clear dim. lumber

Year	Exch Rate	Not Clear dim. material ($/Mfbm)					Clear dim. Material ($/Mfbm)			Stand Value Multiplier			Clear dim. Material ($/Mfbm)			Stand Value Multiplier		
		US Dollars		Canadian Dollars														
		2x4	2x6	2x4	2x6	Comb.	2x4	2x6	Comb.	2x4	2x6	Comb.	3x6	4x6	Comb.	3x6	4x6	Comb.
2000	1.444	400	500	578	722	650	2573	3325	2949	4.5	4.6	4.5	4910	4910	4910	7.6	7.6	7.6
1999	1.526	399	512	609	781	695	2270	2792	2531	3.7	3.6	3.6	4261	4255	4258	6.1	6.1	6.1
1998	1.436	505	603	726	866	796	2239	2677	2458	3.1	3.1	3.1	3982	3942	3962	5.0	5.0	5.0
1997	1.373	621	632	852	867	860	1949	2556	2253	2.3	2.9	2.6	3736	3728	3732	4.3	4.3	4.3
1996	1.357	455	490	617	666	642	1754	2323	2039	2.8	3.5	3.2	3549	3534	3541	5.5	5.5	5.5
1995	1.404	353	448	496	629	563	1812	2259	2036	3.7	3.6	3.6	3528	3519	3523	6.3	6.3	6.3
1994	1.315	383	501	504	659	582	1647	1863	1755	3.3	2.8	3.0	2685	2700	2693	4.6	4.6	4.6
1993	1.278	450	547	574	699	637	1530	1734	1632	2.7	2.5	2.6	2301	2338	2319	3.6	3.7	3.6
1992	1.151	485	517	558	596	577	1294	1523	1409	2.3	2.6	2.4	1801	1785	1793	3.1	3.1	3.1
1991	1.157	359	384	415	444	430	1128	1309	1219	2.7	2.9	2.8	1618	1580	1599	3.8	3.7	3.7
1990	1.161	316	387	366	450	408	1050	1276	1163	2.9	2.8	2.9	1604	1512	1558	3.9	3.7	3.8
1989	1.191	299	364	356	434	395	1139	1317	1228	3.2	3.0	3.1	1623	1598	1611	4.1	4.1	4.1
1988	1.299	292	366	379	475	427	1287	1527	1407	3.4	3.2	3.3	2090	2045	2067	4.9	4.8	4.8
1987	1.379	308	359	425	495	460	1402	1566	1484	3.3	3.2	3.2	2232	2229	2231	4.9	4.8	4.8
1986	1.401	266	299	373	419	396	1111	1248	1180	3.0	3.0	3.0	1724	1760	1742	4.4	4.4	4.4
1985	1.323	223	284	296	376	336	933	963	948	3.2	2.6	2.8	1274	1286	1280	3.8	3.8	3.8
1984	1.246	265	355	331	442	387	911	946	929	2.8	2.1	2.4	1179	1146	1162	3.1	3.0	3.0
1983	1.23	344	400	423	492	458	984	992	986	2.3	2.0	2.2	1217	1252	1235	2.7	2.7	2.7
1982	1.187	259	307	307	347	327	961	988	963	3.1	2.8	3.0	1172	1276	1224	3.6	3.9	3.7
1981	1.195	250	299	299	378	339	828	855	842	2.8	2.3	2.5	1020	988	1004	3.0	2.9	3.0

Average $/Mfbm values for Western Redcedar for the last 5 – 20 years.

	Non-clear dimensional ($/Mfbm)			Clear dimensional products ($/Mfbm)					
	2x4	2x6	Comb.	2x4	2x6	Comb.	3x6	4x6	Comb.
last 5 years	676	780	729	2157	2735	2446	4088	4074	4081
last 10 years	593	693	643	1820	2236	2028	3237	3229	3233
last 15 years	522	613	568	1612	1953	1783	2776	2762	2769
last 20 years	474	562	518	1440	1702	1571	2375	2369	2372

Coastal Western Hemlock (available dim. lumber)

Madison's Canadian Lumber Reporter 20 year prices for clear/ not-clear dim. lumber

Year	Exch Rate	Not Clear dim. material ($/Mfbm)					Clear dim. Material ($/Mfbm)			Stand Value Multiplier			Clear dim. Material ($/Mfbm)				Stand Value Multi-plier		
		US Dollars		Canadian Dollars															
		2x4	2x6	2x4	2x6	Comb.	2x4	2x6	Comb.	2x4	2x6	Comb.	21/2x6	3x6	4x6	Comb.	2+x6	3x6	4x6
2000	1.444	261	290	377	418	398	2136	2198	2,167.0	5.7	5.3	5.5	3307	3356	3376	3346	8.3	8.4	8.5
1999	1.526	373	372	569	567	568	1926	1949	1938	3.4	3.4	3.4	3364	3405	3462	3410	5.9	6.0	6.1
1998	1.436	316	314	453	450	452	2079	2055	2067	4.6	4.6	4.6	3193	3254	3312	3253	7.1	7.2	7.3
1997	1.373	391	389	537	534	536	2025	2030	2028	3.8	3.8	3.8	3118	3164	3214	3166	5.8	5.9	6.0
1996	1.357	405	409	550	555	553	1861	2004	1933	3.4	3.6	3.5	3221	3206	3190	3206	5.8	5.8	5.8
1995	1.404	317	317	445	445	445	1833	1964	1899	4.1	4.4	4.3	3403	3355	3207	3322	7.6	7.5	7.2
1994	1.315	398	390	524	512	518	1683	1789	1736	3.2	3.5	3.4	2818	2812	2733	2788	5.4	5.4	5.3
1993	1.278	395	394	505	503	504	1575	1671	1623	3.1	3.3	3.2	2366	2400	2411	2392	4.7	4.8	4.8
1992	1.151	279	274	322	316	319	1244	1211	1228	3.9	3.8	3.9	1449	1499	1621	1523	4.5	4.7	5.1
1991	1.157	240	242	278	279	279	1194	1168	1181	4.3	4.2	4.2	1382	1435	1549	1455	5.0	5.1	5.6
1990	1.161	240	242	279	281	280	1233	1157	1195	4.4	4.1	4.3	1373	1388	1450	1404	4.9	5.0	5.2
1989	1.191	247	246	294	293	294	1029	1095	1062	3.5	3.7	3.6	1382	1503	1538	1474	4.7	5.1	5.2
1988	1.299	236	233	306	303	305	993	1028	1011	3.2	3.4	3.3	1415	1646	1667	1576	4.6	5.4	5.5
1987	1.379	235	237	324	327	326	1005	1028	1017	3.1	3.1	3.1	1538	1643	1676	1619	4.7	5.0	5.1
1986	1.401	218	214	305	300	303	810	831	821	2.7	2.8	2.7	1216	1272	1329	1272	4.0	4.2	4.4
1985	1.323	200	198	265	262	264	566	596	581	2.1	2.3	2.2	907	904	969	927	3.4	3.4	3.7
1984	1.246	193	190	241	236	239	639	643	641	2.7	2.7	2.7	898	898	898	898	3.8	3.8	3.8
1983	1.23	222	209	273	257	265	792	793	793	2.9	3.1	3.0	1008	1007	1024	1013	3.8	3.8	3.9
1982	1.187	162	165	192	195	194	804	804	804	4.2	4.1	4.1	1080	1030	1086	1065	5.6	5.3	5.6
1981	1.195	177	179	211	214	213	715	723	719	3.4	3.4	3.4	967	964	1025	985	4.5	4.5	4.8

Average $/Mfbm values for Coastal Western Hemlock for the last 5 – 20 years.

	Non-clear dimensional ($/Mfbm)			Clear dimensional prod-ucts ($/Mfbm)						
	2x4	2x6	Comb.	2x4	2x6	Comb.	21/2x6	3x6	4x6	Comb.
last 5 years	497	505	501	2005	2047	2027	3241	3277	3311	3276
last 10 years	456	458	457	1756	1804	1780	2762	2789	2807	2786
last 15 years	405	406	405	1508	1545	1527	2303	2356	2382	2347
last 20 years	363	362	363	1307	1337	1322	1970	2007	2037	2005

APPENDIX D: 20-Year Whitewood Chip Prices

Whitewood chip price data in the following table are extrapolated from the TIPSY 3.0b Help screen plus data supplied by S. Tec Enterprises Ltd. and Revenue Branch.

Cedar chip price (average 20 year value) was sourced from TIPSY 3.0b Help screen.

Whitewood chips - coast and interior

	Interior Chip Prices/BDU				Coastal Chip prices/BDU		
1981	95	1.063	101	1981	144	1.063	153
1982	88	1.063	93	1982	130	1.063	138
1983	63	1.063	66	1983	84	1.063	89
1984	70	1.063	74	1984	85	1.063	90
1985	59	1.063	63	1985	69	1.063	73
1986	60	1.063	64	1986	82	1.063	87
1987	73	1.063	78	1987	103	1.063	109
1988	76	1.063	81	1988	103	1.063	109
1989	88	1.063	93	1989	110	1.063	117
1990	85	1.063	90	1990	105	1.063	112
1991	67	1.063	71	1991	88	1.063	94
1992	62	1.063	66	1992	86	1.063	91
1993	61	1.063	65	1993	84	1.063	89
1994	75	1.063	80	1994	85	1.063	90
1995	171	1.063	182	1995	168	1.063	179
1996	127	1.063	135	1996	110	1.063	117
1997	84	1.0411	87	1997	54	1.0411	56
1998	70	1.0296	72	1998	53	1.0296	55
1999	75	1.023	77	1999	52	1.023	53
2000	83	1	83	2000	57	1	57
20-year average			82				93

Reference:
1981-96 coastal and interior chip prices were scaled from Figure 3-9 "Trends in Wood Chip Prices in North America" in TIPSY 3.0b Help.
1997-2000 interior chip prices were obtained from Revenue Branch (SISCO, 2002; Kelowna reference point)
20 year average chip price for cedar is assumed to be \$15/BDU or \$5/m^3 (TIPSY 3.0b Help)
1997-2000 coastal whitewood chip prices were obtained from S. Tec Enterprises Ltd. (2001)